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A NEW CRAYFISH OF THE PROPINQUUS GROUP OF
THE GENUS *ORCONECTES* FROM THE OHIO
DRAINAGE SYSTEM IN WEST VIRGINIA
(DECAPODA: ASTACIDAE)

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A precise definition of the Propinquus Group has never been accomplished, and adequate data are not presently available to delimit accurately the range of variation within the group. There seems no reason to doubt that the new species described below, however, has its closest affinities with *Orconectes propinquus sanborni* (Faxon, 1884: 128), *O. p. propinquus* (Girard, 1852: 88), *O. p. jeffersoni* Rhoades, 1944: 123, *O. obscurus* (Hagen, 1870: 69), *O. erichsonianus* (Faxon, 1898: 659), *O. illinoisensis* Brown, 1956: 163, and *O. virginianensis* Hobbs, 1951: 122, an assemblage that has been designated the Propinquus Group.

This new subspecies is found well within the range of the group; indeed, its present range is surrounded by that of *O. p. sanborni* and *O. obscurus*, and although it is described as a subspecies of *propinquus*, collections are entirely inadequate to delineate the area of intergradation. The evidence that such an area exists is in the variation observed in specimens collected in Roane and Summers Counties, West Virginia (see Variations).

The distinctive feature of this crayfish is the presence of a *caudal eminence* on the caudal surface of the mesial process of the first pleopod of the male. This eminence is so prominent that a cursory examination would result in the conclusion that it is actually comparable to one of the terminal elements (Hobbs, 1940: 56). Only one other member of this genus, *O. quadruncus* (Creaser, 1933: 10), a member of the Hylas

Group, has a mesial process bearing such an eminence and there it is much less prominent than in this crayfish.

We should like to express our appreciation to Dr. E. C. Raney of Cornell University for his kindness in sending us the first specimens we had seen of this new crayfish—those collected by Messrs. van Meter and Taylor.

***Orconectes propinquus erismophorus*,¹ new subspecies**

Diagnosis: Pigmented, eyes normal. Rostrum with marginal tubercles or spines, concave above, median carina absent, margins subparallel or slightly converging distally and not thickened; length of areola 30–40 per cent of entire length of carapace, 3.7 to 4.9 times longer than broad, and with three or four punctations across narrowest part; postorbital ridges strong, terminating cephalically in strong divergent, corneous tubercles; a single lateral spine on each side of carapace. First pleopod of first form male reaching almost to coxopodite of second pereopod when abdomen is flexed; no strong cephalic shoulder present; central projection slightly longer than mesial process with tip curving caudo-distally over mesial process; mesial process straight, subparallel to central projection, distinctly spatulate, with a caudal eminence originating along basal half and projecting distally almost half the distance from its origin to tip of mesial process and subparallel to the latter (Figs. 1, 3, 5). Annulus ventralis immovable, weakly sculptured (Fig. 8).

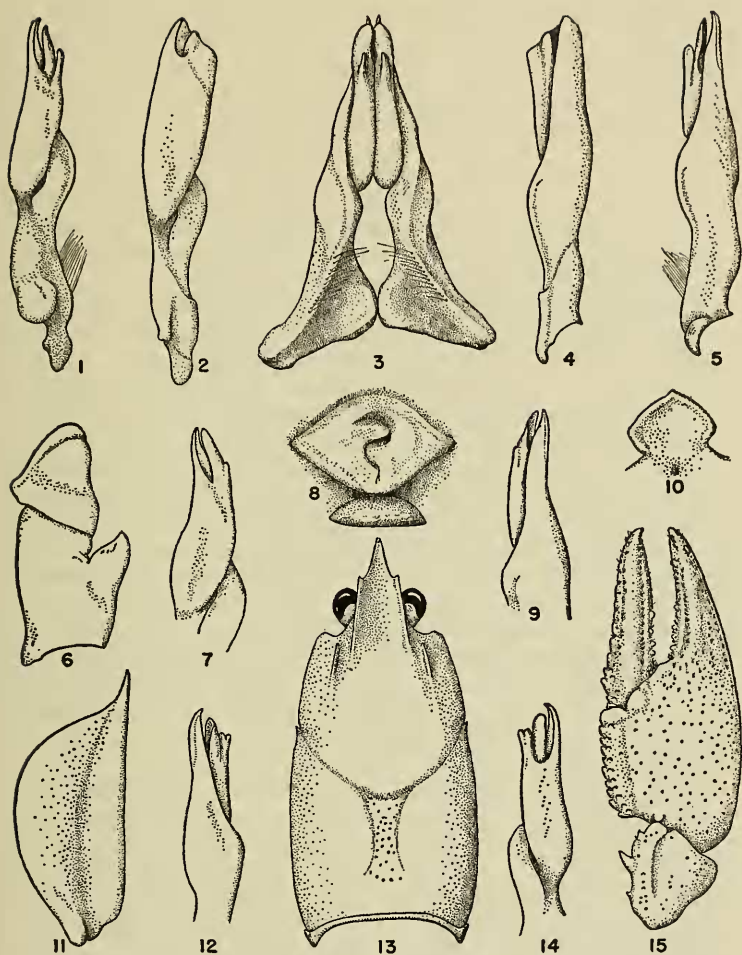
Holotypic Male, Form I: Body subcylindrical, slightly depressed. Abdomen narrower than cephalothorax (9.7–9.9 mm in widest parts respectively). Width of carapace greater than depth in region of caudo-dorsal margin of cervical groove (9.9–7.3 mm).

Areola moderately broad (4.1 times longer than wide) with two or three punctations across narrowest part. Cephalic section of carapace about 1.9 times as long as areola; length of areola 34.3 per cent of entire length of carapace.

Rostrum with subparallel margins which are not distinctly thickened but terminate distally in strong tubercles; upper surface deeply concave and bearing setiferous punctations; a single row of such punctations along mesial sides of marginal ridges extending onto acumen and along lateral sides of margins to marginal tubercles. Acumen long, slender, and extending distad to distal end of peduncle of antennule; tip not upturned. Subrostral ridges evident in dorsal aspect for a short distance at their bases.

Postorbital ridges strong, grooved dorsolaterally, and produced cephalad in prominent divergent tubercles. Suborbital angle lacking. Branchiostegal spines acute. Lateral surface of carapace with a strong acute spine

¹*erismophorus*, from *erisma*, Gr., a buttress, and *phero*, Gr., to bear; so named because of the buttress-like eminence borne on the caudal surface of the mesial process of the first pleopod of the first form male.



FIGS. 1-15. *Orconectes propinquus erismophorus*, new subspecies. 1, Mesial view of first pleopod of holotype. 2, Mesial view of first pleopod of morphotype. 3, Caudal view of first pleopods of holotype. 4, Lateral view of first pleopod of morphotype. 5, Lateral view of first pleopod of holotype. 6, Basipodite and ischiopodite of third pereopod of holotype. 7, Mesial view of distal portion of first pleopod of first form male from Roane County, West Virginia. 8, Annulus ventralis of allotype (injury not illustrated). 9, Lateral view of pleopod in Fig. 7. 10, Epistome of holotype. 11, Antennal scale of holotype. 12, Lateral view of distal portion of first pleopod of first form male from Tucker Creek, 8.4 mi upstream from Elizabeth, Wirt County, West Virginia. 13, Dorsal view of carapace of holotype. 14, Mesial view of pleopod in Fig. 12. 15, Upper surface of distal podomeres of cheliped of holotype.

on each side. Entire carapace studded with setiferous punctations except in extreme cephalolateral ventral portions which bear setiferous granulations.

Abdomen longer than carapace (22.0–20.4 mm). Cephalic section of telson with two spines in each caudolateral corner.

Epistome (Fig. 10) broadly ovate with a tubercular cephalomedian projection.

Antennules of the usual form with a prominent spine on ventral surface of basal segment. Antennae broken, but appear to have extended to about midlength of abdomen. Antennal scale (Fig. 11) about 2.2 times longer than broad and with mesial margin of lamellar portion evenly rounded and widest slightly distal to midlength.

Chela (Fig. 15) somewhat depressed, with palm slightly inflated; all surfaces bearing setiferous punctations. Tubercle present on lower surface of palm at base of dactyl. Inner margin of palm with two irregular rows of tubercles, lower row of eight and upper one of seven. Fingers with a slight gap at base. Upper surface of immovable finger with a broad rounded submedian longitudinal ridge flanked by setiferous punctations; another ridge along proximal three-fourths of finger immediately mesial to aforementioned ridge. Outer margin of immovable finger with a well-defined keel extending proximally two-thirds length of palm; opposable margin of finger with a row of three small rounded tubercles at base and a single one at base of distal one-fourth and crowded minute denticles along distal two-thirds; a submedian longitudinal ridge on lower surface of finger. Dactyl similar to immovable finger above and below; mesial margin with a double row of tubercles along proximal two-thirds, lateral row extending almost to tip of dactyl; opposable margin with four tubercles along basal half and crowded minute denticles in distal half.

Carpus of cheliped longer than broad with a broad shallow longitudinal furrow above; setiferous punctations over entire surface and a few small tubercles on upper surface mesial to furrow; mesial surface with a prominent curved acute spine, and upper mesiodistal surface with a smaller one, upper proximomesial surface with a prominent tubercle; lower submedian distal margin with a small tubercle and lower laterodistal margin with a strong spine. Upper and lower surfaces of merus with scattered setiferous punctations; lateral surfaces generally smooth; two acute spines on upper distal surface; lower mesial surface with a row of eight spines increasing in size distally, terminating in a strong acute distal spine; a single acute distal spine on lower laterodistal margin and a row of three or four tubercles proximal to it. Lower proximal surface of ischiopodite with a small rounded tubercle. Hooks on ischiopodites of third pereopods only (Fig. 6); hooks simple.

First pleopod extending cephalad almost to coxopodite of second pereopods when abdomen is flexed. Tip terminating in two distinct parts with an accessory prominent eminence on mesial process; rami separated for a short distance from tips (Figs. 1, 3, 5). Central pro-

jection corneous, straight except tip curved caudodistally. Mesial process not extending so far distad as central projection, non-corneous, distinctly spatulate, subparallel to central projection, and with a distinct subcylindrical caudal eminence arising at its base and projecting distally, subparallel to process, to base of distal half of process (Fig. 1). Pleopods symmetrical (*sensu* Hobbs, 1962).

Morphotypic Male, Form II: Differs from the holotype in the following respects: Carpus of cheliped with a less prominent spine on mesiodistal surface. Palm less inflated and proportionally smaller than holotype. Epistome without a median tubercle on cephalic margin. Tip of acumen slightly upturned. Hooks on ischiopodites of third pereopod much reduced. Both elements of first pleopod (Figs. 2, 4) non-corneous, blunter, and in close apposition almost to tips; caudal eminence prominent but not so distinctly set off from mesial process; a suture delimiting basal and distal portion of pleopod (Figs. 2, 4).

Allotypic female: Differs from the holotype in the following respects: Acumen slightly upturned. Carpus of cheliped lacking spine on upper mesiodistal surface. Merus less stout and lacking row of tubercles on lower laterodistal margin. First pleopod biramous but weakly developed.

Annulus ventralis immovable, broader than long, fused cephalically with sternum and scarcely elevated (ventrally) above it. Surface weakly sculptured. Sinus arising slightly cephalic to midlength, curves caudodextrally across median line and bends gently caudosinistrally to median line where it turns caudad and terminates submedially in caudal fourth of annulus (Fig. 8). The allotype, the only fully mature female available, has a small crack (not illustrated) in the middle of the annulus.

Measurements: As follows (in millimeters):

	Holotype	Allotype	Morphotype
Carapace—height	7.3	6.5	7.0
width	9.9	8.5	8.4
length	20.4	18.1	17.6
Areola—length	7.0	6.0	6.0
width	1.7	1.5	1.5
Rostrum—length	6.0	5.5	5.3
width	3.2	2.9	2.9
Chela—	right	left	right
length of inner margin of palm ...	5.9	3.6	3.9
width of palm	7.0	4.5	4.5
length of outer margin of hand ...	16.5	9.9	11.8
length of dactyl	9.4	6.1	6.2

Type locality: Crane Nest Creek at Pee Wee, Wirt County, West Virginia. Here, in a cultivated area, the stream is some 15 feet in width, up to 1 foot in depth and flows rapidly over a gravel bottom.

Disposition of types: The holotypic male, form I, the allotypic female, and the morphotypic male (USNM Nos. 107597, 107598, and 107599, respectively) are deposited in the U. S. National Museum. The para-

types are distributed as follows: a first form male, a second form male, and a juvenile female are in the Tulane University Collection; and seven first form males, one second form male and five juvenile females are in the collection of the senior author.

Range: The type series was collected from tributaries of the Little Kanawha River in the vicinity of Elizabeth, Wirt County, West Virginia—type locality (4-1761-2), coll. R. H. Gilpin and H. H. Hobbs, Jr.; Tucker Creek, 6 mi N of Elizabeth (9-1349-2), coll. H. van Meter and G. Taylor; 4.9 mi W of Elizabeth (4-1761-4a), coll. RHG and HHH; 8.4 mi upstream from Elizabeth (4-1761-5a), coll. RHG and HHH. In addition, specimens interpreted as intergrades between *erismophorous* and *sanborni* were collected from the following localities: near Alderson, 0.5 mi W of Greenbriar Co. line (Greenbriar Dr.) on Rt. 3, Summers Co., W. Va. (4-1561-4a), coll. RHG and HHH; 1.6 mi S of Walton on Rt. 119 (Big Kanawha Dr.), Roane Co., W. Va. (4-1661-8), coll. RHG and HHH.

Variations: Perhaps the most conspicuous variations are to be found in the rostrum and in the arrangement of tubercles along the inner margin of the palm of the chela. In general, the rostral margins are subparallel or only slightly convergent distally; however, the length of the rostrum is somewhat variable—in some specimens noticeably shorter than in others, and the same can be said of the acumen. The tubercles along the inner margin of the palm are arranged roughly into two longitudinal rows but in all of the specimens there are additional tubercles between and flanking these rows; in a few instances they are so numerous as almost to obscure a linear arrangement. Three first form males from Tucker Creek exhibit a variation in the caudal eminence on the mesial process of the first pleopod in that the distal extremity of the eminence on one of the pair in each instance is bilobed (Figs. 12, 14).

The specimens that have been interpreted as representing intergrade populations are from a tributary of the Kanawha River in Roane County and from a tributary of the Greenbriar River in Summers County. Specimens from the former locality include those which appear to be typical *sanborni* in every respect; however, three males have pleopods which exhibit various degrees of development of the caudal eminence of the mesial process. In none of them, however, is the eminence so strongly developed as it is in typical *erismophorous*. In the collection from the tributary of the Greenbriar, there are three first form males, which possess a uniformly weak caudal eminence on the pleopods (Figs. 7, 9); thus they are neither good *sanborni* nor good *erismophorous* and have been assigned to the intergrade series. Geographically, this latter population is situated deep within the range of *sanborni*, and an interpretation of this apparent anomaly must await series of specimens from many more localities in the Kanawha drainage system.

Relationships: There seems to be no doubt that *O. p. erismophorous* has its closest affinities with *O. p. sanborni* but may be distinguished

from it by the presence of a prominent caudal eminence on the mesial process of the first pleopod of the male.

Remarks: Because of the rarity of ornamentation of the mesial process of the first pleopod in the Cambarinae and the appearance of the caudal eminence in *erismophorous*, the possibility was considered that this lobe represented the retention of the cephalic process of the hypothetical ancestor (Hobbs, 1940). Superficially, it appeared possible that there could have been an extreme rolling of the distal portion of the pleopod with the displacement of the cephalic process caudomesially to lie caudal to the mesial process. Gross dissection of one of the pleopods proved inadequate to establish the relationships of the eminence and the mesial process to the central projection and a second appendage was sectioned at 20 microns. The rationale involved was that if the mesial process were continuous with the central projection only through the caudal eminence, it would indicate that the eminence was the retained cephalic process; if, to the contrary, the mesial process was continuous with the central projection and the eminence arose as an outgrowth from the former, then the caudal eminence must be considered an outgrowth of the mesial process. The latter relationship was demonstrated to exist. Thus, although the first pleopod appears to terminate in "three parts," morphologically it actually ends in "two parts" with an embossment on the mesial process.

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